Blood Conservation: Cultural Change in Pediatric Intensive Care Nursing

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Background

• Monitoring of PICU patients requires repeated blood sampling
• Excessive sampling can lead to anemia
• Upon Pediatric Intensive Care Unit (PICU) admission: 33% of patients are anemic & 41% develop anemia (Bateman et al., 2008)
• Anemia increases PICU length of stay and days of mechanical ventilation (Bateman et al., 2008)
• Anemia is often treated with Red Blood Cell (RBC) transfusion
• RBC transfusion is associated with increased healthcare costs & morbidity (Bateman et al., 2008; Gauvin et al., 2012)
• Blood Conservation (BC) strategies are needed in the PICU

Purpose

• Create sustainable changes in PICU practice & culture to reduce the amount of blood draw
• Investigate PICU nurses blood sampling practices
• Understand why PICU blood sampling practices exist
• Reveal clinically-relevant approaches to decrease blood sampling-induced anemia and RBC transfusion in critically ill pediatric patients

Conceptual Model

Using an adapted Conceptual Model of Implementation Research (Proctor et. al., 2009), we identified implementation strategies and desired outcomes for BC.

Adapted Conceptual Model of Implementation Research

OBJECTIVE: Blood Conservation (BC)

IMPLEMENTATION PHASE:

• Blood Conservation (BC) Practices
  - venous “Safe Draw” Closed-loop System
  - reduced blood waste
  - reduced blood draw
  - reduced blood overdraw
  - reduced anemia
  - reduced RBC transfusions
• Blood Culture
  - risk management program
  - nursing champions
  - audits
  - feedback
  - blood volume reference standardization

BC Nurse Perceptions of BC

| Response Rate | 98% of PICU nurses participated |
| Minimal Volumes | Information not well-known |
| Micro-tubes | Not as easily available as standard volume tubes |
| Blood waste | Large blood waste discarded when drawing from a central line |
| Variety of practices & attitudes about returning blood waste |

Focus Group Findings

<table>
<thead>
<tr>
<th>Barriers &amp; Motivators to BC</th>
<th>Response Rate 82% of PICU nurses participated</th>
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</thead>
<tbody>
<tr>
<td>It’s the right thing to do.</td>
<td>Study increased awareness</td>
</tr>
<tr>
<td>RN minimum volume knowledge deficit</td>
<td>RN lack of attention to volume of blood routinely drawn</td>
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<tr>
<td>RN blood waste knowledge deficit</td>
<td>Current Lab Reference Guide is under-utilized</td>
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<tr>
<td>• Current Lab Reference Guide does not have necessary information for BC</td>
<td>RNs have easier access to large volume tubes over micro-tubes</td>
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<tr>
<td>• Lack of closed-loop system for drawing from central lines</td>
<td>Current policies limit blood waste return</td>
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<td>• Poor communication between PICU and laboratory staff</td>
<td>Inconsistent RN practices</td>
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Blood Conservation Interventions

Minimal Volume Reference Guide

• Collaborated with laboratory staff to develop a minimal volume bedside reference guide
• Includes exact blood volume required for testing
• Covers >50% of laboratory combinations used in PICU
• Shows what laboratory combinations require a standard-volume tube vs. a micro-tube
• Easily accessible to reference prior to drawing blood

Micro-tube Standardization

• Changed stock levels of micro-tubes & standard-volume tubes in patient rooms
• More micro-tubes are now easily available for nursing staff to use

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Venous “Safe Draw” Closed-loop System

• A closed-loop system for central-line blood draws was developed
• System allows waste blood to be returned to patient
• System trialed on a select number of PICU Patients

Blood Culture Policy Change

• Blood culture policy not consistent with best practice in pediatric hospitals
• Blood culture sample volume drawn inconsistent through hospital
• The blood culture policy changed for PICU patients
• Less blood required for patients with multiple blood access sites

Old Policy

Send 1 ml per year of age, up to 15 ml PER LUMEN of lines being cultured

Example: 3-year-old patient
Has a double lumen Broviac and an arterial line = 3 lumens
Send 3 ml per lumen = 9 ml of blood total

New Policy

Send 1 ml per year of age, up to 15 ml TOTAL

Example: 3-year-old patient
Has a double lumen Broviac and an arterial line = 3 lumens
Send 1 ml of blood per lumen = 3 ml of blood total

References

